SeaLINK+4.SC User Manual

Item Number 2423

SEALEVEL SYSTEMS INCORPORATED

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Table of Contents

INTRODUCTION **1**

BEFORE YOU GET STARTED **2**

WHAT'S INCLUDED 2
OPTIONAL ITEMS 2

INSTALLATION & CONFIGURATION **4**

SOFTWARE INSTALLATION 4
HARDWARE INSTALLATION 5
VERIFYING INSTALLATION 6
HARDWARE CONFIGURATION 7

HARDWARE DESCRIPTION **10**

ELECTRICAL SPECIFICATIONS **11**

ELECTRICAL SPECIFICATIONS **11**

CONNECTOR PINOUTS 11

TECHNICAL SPECIFICATIONS **12**

DIMENSIONS 12
ENVIRONMENTAL SPECIFICATIONS 12
POWER REQUIREMENTS 12
MANUFACTURING 12

APPENDIX A – TROUBLESHOOTING **13**

APPENDIX B – HOW TO GET ASSISTANCE **16**

APPENDIX C – ELECTRICAL INTERFACES **17**

APPENDIX D – ASYNCHRONOUS COMMUNICATIONS **18**

APPENDIX E – SILK SCREEN - 2423 ..... **19**

APPENDIX F – COMPLIANCE NOTICES **20**

FEDERAL COMMUNICATIONS COMMISSION STATEMENT 20

WARRANTY **21**

Introduction

Sealevel's SeaLINK 2423 USB to serial interface adapter offers an easy way to connect up to four serial devices to a single USB port. All configuration and electrical interface selections are handled through the driver and each port is individually software configurable for RS-232, RS-422, or RS-485 (full and half duplex).

Sealevel's SeaCOM USB software drivers and utilities package makes installation and operation easy for Windows 98, ME, 2000, XP, and Vista operating systems. Once the software is installed, plug the 2423 into an available USB port and each serial port is recognized as standard COM ports by the host system; this feature enables compatibility with legacy software. The devices maintain their electrical interface settings locally, allowing the host computer to be repaired or upgraded without reconfiguring the serial ports. Additionally, the devices can be configured at one computer and deployed to other computers.

To prevent accidental cable disconnection, the 2423 includes a highly-retentive USB Type B connector. Standard operating temperature range is 0°C to 70°C and extended temperature range (-40°C to +85°C) is optional. Status LEDs display electrical interface selection and serial data activity for each port.

Features

- Each port is individually software configurable for RS-232, RS-422, and two-wire or four-wire RS-485
- Electrical interface settings maintained across multiple computers
- High speed UART with 128-byte Tx FIFO and 384-byte Rx FIFO
- Automatic hardware RS-485 enable/disable
- Each serial port supports data rates to 921.6K bps
- Powered by USB host connection
- Four DB9M connectors with full modem control signals implemented in RS-232 mode
- Status LEDs indicate power, electrical interface, and serial data activity for each port

Before You Get Started

What's Included

The 2423 is shipped with the following items. If any of these items is missing or damaged please contact Sealevel for replacement.

- **2423 –** USB to RS-232/422/485 Four Port Serial Interface Adapter
- **CA179 –** USB Type A to USB Type B Device Cable, 6' in Length
- **Sealevel Software CD –** SeaCOM software and user manual

Optional Items

Depending upon your application, you are likely to find one or more of the following items useful with the 2423. All items can be purchased from our website (http://www.sealevel.com) or by calling our sales team at 864-843-4343.

Cables

DB9F to DB25M (RS-232) Extension Cable (Item# CA177)

The CA177 is a standard AT-style RS-232 modem cable with a DB9F connector on one end and a DB25M connector on the other. This cable is 72 inches in length.

DB9F to DB9M Extension Cable (Item# CA127)

The CA127 allows users to extend a DB9 cable up to six feet. The connectors are pinned one-to-one so the cable is compatible with any device or cable that has DB9 connectors.

DB9F (RS-422) to DB25M (RS-530) Cable (Item# CA176)

The CA176 allows users to convert any Sealevel RS-422 DB9 Male asynchronous adapter to an RS-530 DB25 Male pinout. This cable is ten inches in length.

Terminal Blocks

Terminal Block – DB9F to 9 Screw Terminals (Item# TB05)

The TB05 terminal block breaks out a DB9 connector to nine screw terminals to simplify field wiring of serial connections including RS-422 and RS-485 networks. The TB05 is designed to connect directly to Sealevel DB9 serial cards or any cable with a DB9M connector.

Terminal Block – Dual DB9F to 18 Screw Terminals (Item# TB06)

The TB06 terminal block breaks out dual DB9 connectors to 18 screw terminals to simplify field wiring of serial connections including RS-422 and RS-485 networks. The TB06 is designed to connect directly to Sealevel dual port DB9 serial cards or any cable with DB9M connectors.

Adapters and Converters

DB9F to RJ45 Modular Adapter (Item# RJ9S8)

The RJ9S8 is a DB9 female to RJ45 adapter. It can be configured without tools, and it is an excellent choice for using available infrastructure wiring.

Installation & Configuration

Software Installation

Windows 98/ME/ 2000/XP/Vista™ Operating Systems

1. Start Windows.
2. Insert the Sealevel Software CD in to your CD/DVD drive.
3. If 'Auto-Start' is enabled the installation window will automatically appear. Otherwise, navigate to the root directory of your CD drive and double-click the 'autorun.exe' application to launch the installation window.
4. Click on the 'Install' button.
5. Type in your part number (2423) or select your adapter from the listing.
6. Click the 'Install Drivers' button.
7. The setup file will automatically detect the operating environment and install the proper components.

To confirm that the SeaCOM driver has been successfully installed, click on the 'Start' button, and then select 'All Programs'. You should see the 'SeaCOM' program folder listed.

You are now ready to proceed with connecting the 2423 to your system. Refer to the Hardware Installation section for details.

Windows NT is not USB aware and thus cannot support this device.

Hardware Installation

Do not connect the device to a USB port until the software has been successfully installed.

To install the 2423, plug the device into an available USB port using the supplied USB cable. The following instructions were tested with Windows XP and may vary based on your version of Windows.

Once the device has been connected, the Found New Hardware wizard will appear first for the root hub and then for each port that you are installing. Follow the instructions on the following page to finish installation.

The installation will repeat twice for each COM port (a total of 8 times on four port devices). This is a limitation in the way Windows installs external serial devices.

1. Click on 'Install the software automatically' followed by the 'Next' button.
2. Windows will show a warning message that the hardware has not passed Windows logo testing. Click on 'Continue Anyway'.

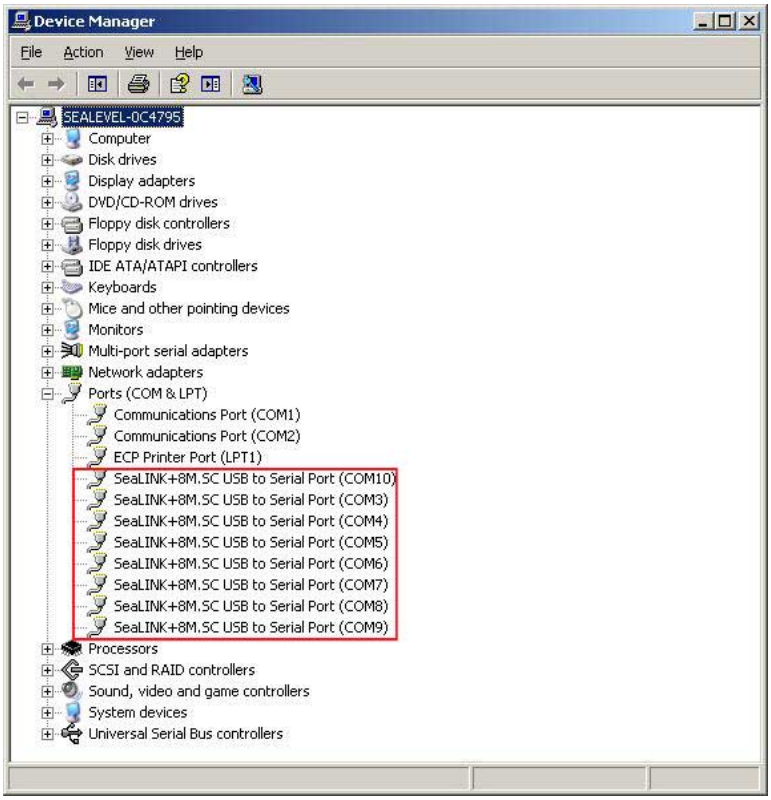
   Note: all applications and drivers have been fully tested to maintain the integrity of your operating system. Clicking on 'Continue anyway' will not harm your system in any way.
3. Click on 'Finish'. Repeat this process for the remaining ports on the 2423.

Verifying Installation

To confirm that the ports have been successfully installed, you can look in Device Manager under 'Ports (COM &LPT)' and each of the ports you installed will be included on the list with their associated COM numbers. To access Device Manager, follow the steps below:

1. Right-click on the 'My Computer' icon on your desktop or in the Start menu.
2. Click on 'Properties' in the fly out menu to launch the 'System Properties' window.
3. Click on the 'Hardware' tab and then click on the 'Device Manager' button.
4. When Device Manager launches, look under 'Ports (COM & LPT)' to verify that the serial ports have been correctly installed (screen shot for 2833 shown).

Note: Your system will assign the next available COM numbers which may vary for each computer used. The Port Manager utility included with SeaCOM can be useful in reassigning COM numbers.



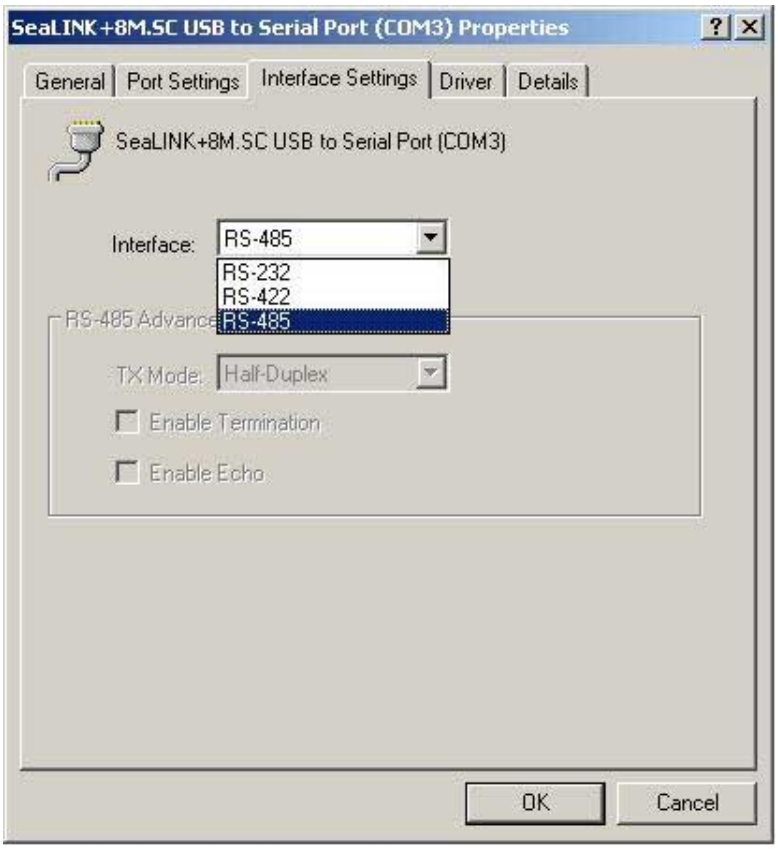
Hardware Configuration

Electrical Interface Mode Selection

The 2423 offers RS-232, RS-422, and RS-485 (full and half duplex) modes. The electrical interface is a software selectable feature that can be accessed and changed using the Sealevel SeaCOM driver via Device Manager. To select the electrical interface, follow the steps below:

1. Open Device Manager and locate 'Ports (COM&LPT)' following the steps above. You should see each of the 2423's ports listed.
2. Select one of the ports by right-clicking on it and selecting 'Properties' from the fly out menu. The serial port properties menu will appear
3. Click on the 'Interface Settings' tab

   Note: The Sealevel SeaCOM driver adds the 'Interface Settings' tab. If this tab is missing, SeaCOM is not correctly installed.



4. Select the appropriate electrical interface for your application and click on 'OK'.

Note: The electrical interface settings are maintained across multiple computers. Once the SeaCOM software driver has been installed on target computers, the 2423 can easily be moved from one computer to another without having to configure the electrical interface at each computer.

Interface Biasing

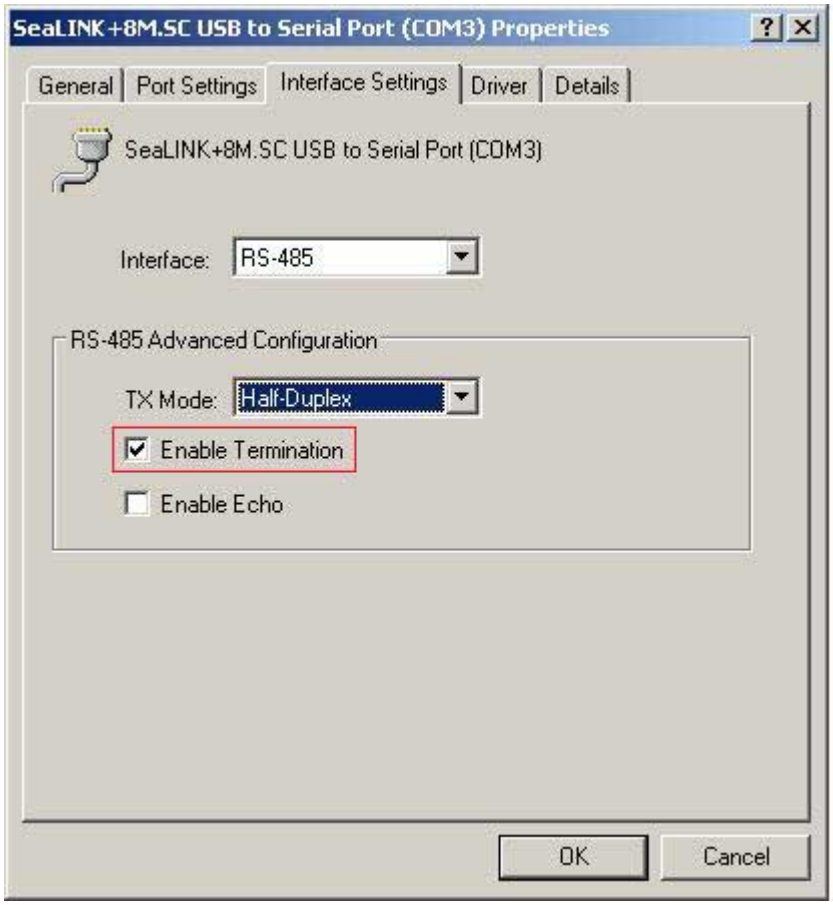
1K-ohm pull up/pull down combination resistors bias the receiver inputs and are handled automatically for each mode. The pull-up (PU) and pull-down (PD) resistor settings are shown in the table below.

Mode	PU Setting	PD Setting
RS-232	Always Off	Always Off
RS-422	Always Off	Always Off
RS-485	Always On	Always On

Line Termination

A 120-ohm resistor is across each RS-422/485 input. If multiple devices are configured in an RS-485 network, only the devices on each end should have the termination in place.

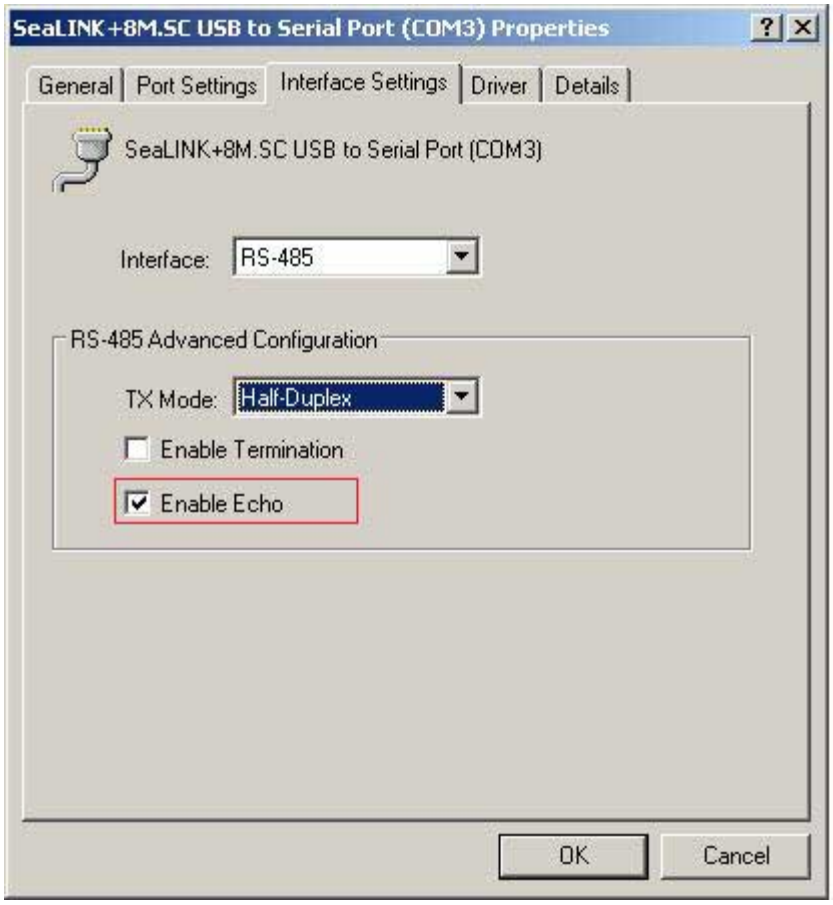
Termination configuration is software selectable for both full- and half-duplex RS-485. By default, line termination is disabled, and this configuration can be set by placing a check next to 'Enable Termination' in the 'RS-485 Advanced Configuration' field, as shown in the image below.



Echo

The RS-485 ‘Echo’ is the result of connecting the receiver inputs to the transmitter outputs. Each time a character is transmitted; it is also received. This can be beneficial if the software can handle echoing (i.e. using received characters to throttle the transmitter), but it can also confuse the system if the software cannot support echoing.

Echo configuration is software selectable for half-duplex RS-485. By default, ECHO is disabled, and this configuration can be set by placing a check next to ‘Enable Echo’ in the ‘RS-485 Advanced Configuration’ field, as pictured below.



High-Retention USB Port

The upstream port integrates a high-retention type B connector that prevents accidental disconnection of the USB cable.

Status LEDs

Status LEDs on the front of the 2423 indicate the following information:

- MODE (Red or Green) – Indicates the electrical interface selected
  - Green indicates RS-232 mode
  - Red indicates RS-422 or RS-485 mode
- DATA (Green) – Blinks to indicate data is being transmitted or received
- POWER (Green) – Lights when the hub is properly powered through the USB connection

DB9M Serial Connectors

The 2423 includes four DB9M serial connectors on the back of the device and full modem control signals are implemented. Pinouts are included in the following Electrical Specifications section.

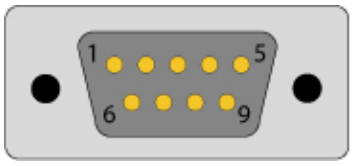
Electrical Specifications

The 2423 connects to a single USB port and provides four RS-232/422/485 software configurable serial ports. The 2423 utilizes high speed USB/UARTs with 128-byte Tx FIFOs and 384-byte Rx FIFOs. The chips feature programmable baud rates and data rates to 921.6K bps.

Connector Pinouts

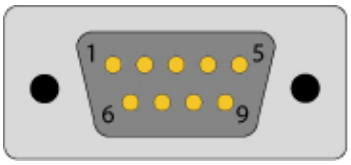
RS-232 (DB9 Male)

Pin #	Signal
1	DCD
2	RX
3	TX
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI



RS-422 & RS-485 Four-Wire (DB9 Male)

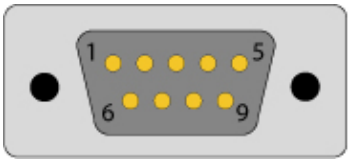
Pin #	Signal
1	RX+
2	RX-
3	TX-
4	TX+
5	GND



Note: Pins 6-9 are 'no connect'

RS-485 Two-Wire (DB9 Male)

Pin #	Signal
3	DATA-
4	DATA+
5	GND



Note: Pins 1, 2, 6-9 are 'no connect'

Technical Specifications

Dimensions

Length	Width	Height
9.2”	5.3”	1.7”
23.4cm	13.5cm	4.3cm

Environmental Specifications

Specification	Operating	Storage
Temperature Range	0°C – 70°C (32°F – 158°F)	-50°C – 105°C (-58°F – 221°F)
Humidity Range	10 to 90% R.H. Non-Condensing	10 to 90% R.H. Non-Condensing

Power Requirements

This device is a high power USB device. It must be plugged directly into a USB port on your computer or a self-powered hub capable of supplying 500 mA per port. Some laptop computers running on battery power and non-powered USB hubs do not provide the full 500mA necessary to power this device.

Manufacturing

All Sealevel Systems printed circuit boards are built to UL 94V0 rating and are 100% electrically tested. These printed circuit boards are solder mask over bare copper or solder mask over tin nickel.

Appendix A – Troubleshooting

The adapter should provide years of trouble-free service. However, in the event that it appears to be functioning incorrectly, the following tips can eliminate most common problems without the need to call Technical Support.

1. Ensure that the Sealevel Systems SeaCOM software has been installed on the machine so that the necessary files are in place to complete the installation. To confirm installation, click on the Windows 'Start' button and then select 'All Programs'. You should see the 'SeaCOM' program folder listed.

   Note: The SeaCOM driver **must** be installed **before** the adapter is connected to your computer.

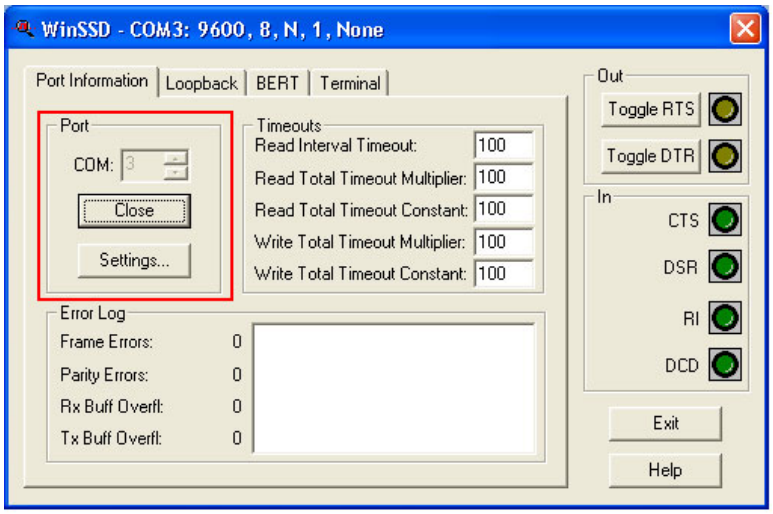
2. Check to make sure that USB support is enabled and functioning properly in the operating system. The presence of the 'Universal Serial Bus controllers' listing in Device Manager will confirm that USB support is enabled in Windows 98, ME, 2000, XP, or Vista operating systems.

3. While Device Manager is open, locate the COM ports (described under "Verifying Installation" in the Installation and Configuration section of this manual).

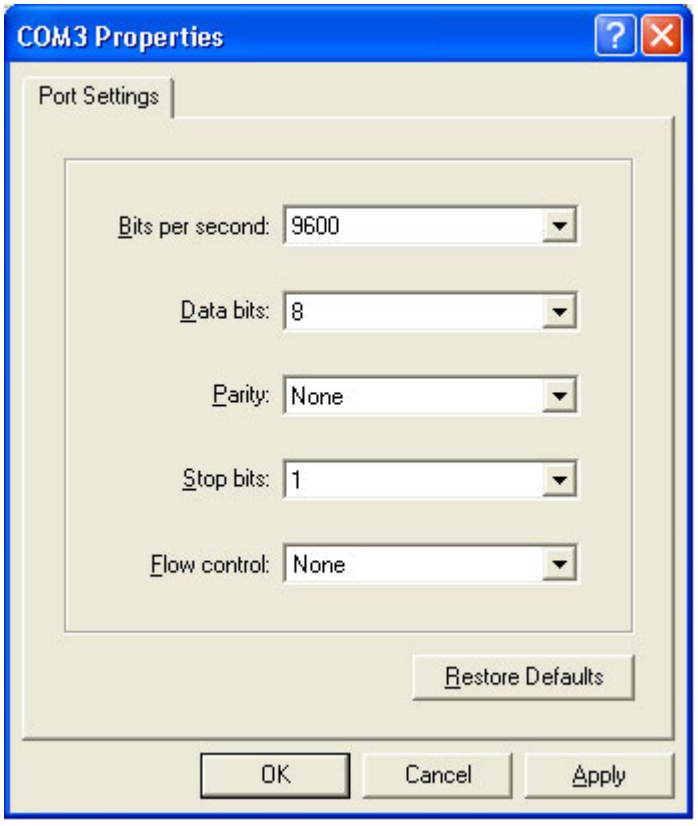
4. Once you have confirmed that the COM ports are listed in Device Manager, you can use the Sealevel WinSSD utility and a loopback plug to test communications. Detailed help is included in the WinSSD utility.

   - If you have a loopback plug, put it on the DB9 connector that you want to test. If you don't have a loopback plug, contact Technical Support for assistance.
   - If you're testing RS-485 mode, you'll need to have ECHO enabled otherwise the following test will fail. Refer to the Hardware Configuration section for instructions on enabling ECHO.
   - To test communications, launch the WinSSD utility in the SeaCOM folder under the 'Start' menu.

- On the ‘Port Information’ tab, select the COM port you want to test and click on the ‘Open’ button. (pictured below)

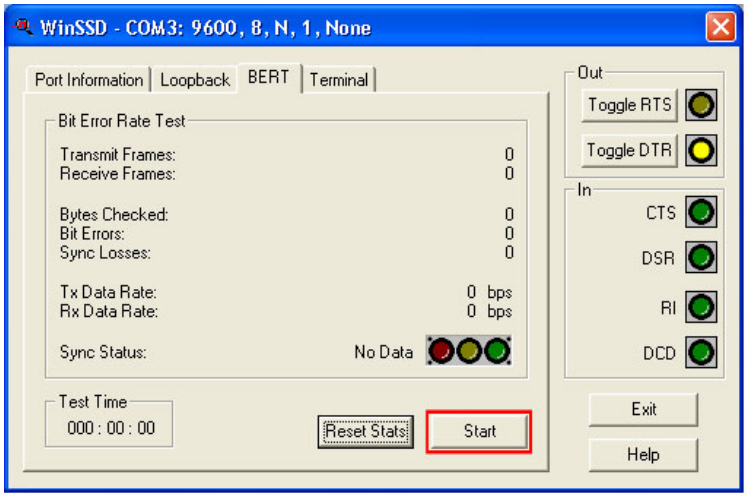


- Click the ‘Settings’ button to open the COM Properties menu. Change your parameters to 9600 bits per second, 8 data bits, no parity, 1 stop bit, and no flow control, as pictured below.

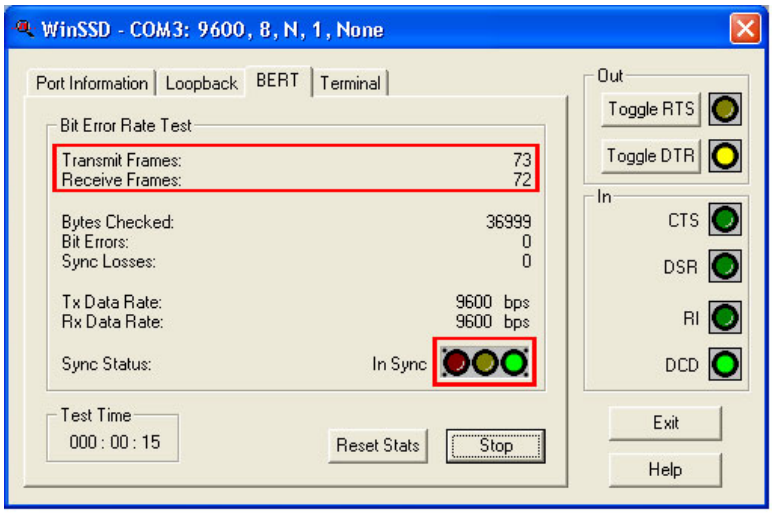


- Click ‘Apply’ and ‘Ok’.

- Select the ‘BERT’ tab and with the loopback connected to the port you wish to test, click on the ‘Start’ button. If testing RS-485, be sure that ECHO is enabled. (Pictured below)



- If the COM port is working properly, the green light will glow and the Transmit Frames and Receive Frames will increase. The Tx and Rx Data Rates will show the calculated data rate. (Pictured below)



- You can continue testing this port with different configurations or proceed with testing other ports, if necessary.

If these steps do not solve your problem, please call Sealevel Systems’ Technical Support, (864) 843-4343. Our technical support is free and available from 8:00 AM to 5:00 PM Eastern Time Monday through Friday. For email support contact support@sealevel.com.

Appendix B – How To Get Assistance

Begin by reading the Troubleshooting Guide in **Appendix A**. This will help solve most common problems.

When calling for technical assistance, please have the device installed and ready to run diagnostics. If possible, have your user manual and current adapter settings ready.

The Sealevel website is an excellent resource. Our homepage is located online at http://www.sealevel.com. The most current software updates and user manuals are available via our homepage by clicking on the 'Drivers' or 'Manuals' links located under 'Technical Support.' Manuals and software can also be downloaded from the product page for your device.

The FAQ section of our website answers many common questions. Refer to this helpful resource by visiting http://www.sealevel.com/faq.asp.

Technical support is available Monday through Friday from 8:00am to 5:00pm EST and can be reached by phone at +1 (864) 843-4343 or via email at support@sealevel.com.

RETURN AUTHORIZATION MUST BE OBTAINED FROM SEALEVEL SYSTEMS BEFORE RETURNED MERCHANDISE WILL BE ACCEPTED. AUTHORIZATION CAN BE OBTAINED BY CALLING SEALEVEL SYSTEMS AND REQUESTING A RETURN MERCHANDISE AUTHORIZATION (RMA) NUMBER.

Appendix C – Electrical Interfaces

RS-232

Quite possibly the most widely used communication standard is RS-232. This implementation has been defined and revised several times and is often referred to as RS-232 or EIA/TIA-232. The IBM PC computer defined the RS-232 port on a 9 pin D sub connector and subsequently the EIA/TIA approved this implementation as the EIA/TIA-574 standard. This standard is defined as the 9-Position Non-Synchronous Interface between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange. Both implementations are in wide spread use and will be referred to as RS-232 in this document. RS-232 is capable of operating at data rates up to 20 Kbps at distances less than 50 ft. The absolute maximum data rate may vary due to line conditions and cable lengths. RS-232 is a single ended or unbalanced interface, meaning that a single electrical signal is compared to a common signal (ground) to determine binary logic states. The RS-232 and the EIA/TIA-574 specification define two types of interface circuits, Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE).

RS-422

The RS-422 specification defines the electrical characteristics of balanced voltage digital interface circuits. RS-422 is a differential interface that defines voltage levels and driver/receiver electrical specifications. On a differential interface, logic levels are defined by the difference in voltage between a pair of outputs or inputs. In contrast, a single ended interface, for example RS-232, defines the logic levels as the difference in voltage between a single signal and a common ground connection. Differential interfaces are typically more immune to noise or voltage spikes that may occur on the communication lines. Differential interfaces also have greater drive capabilities that allow for longer cable lengths. RS-422 is rated up to 10 Megabits per second and can have cabling 4000 feet long. RS-422 also defines driver and receiver electrical characteristics that will allow one driver and up to 32 receivers on the line at once. RS-422 signal levels range from 0 to +5 volts. RS-422 does not define a physical connector.

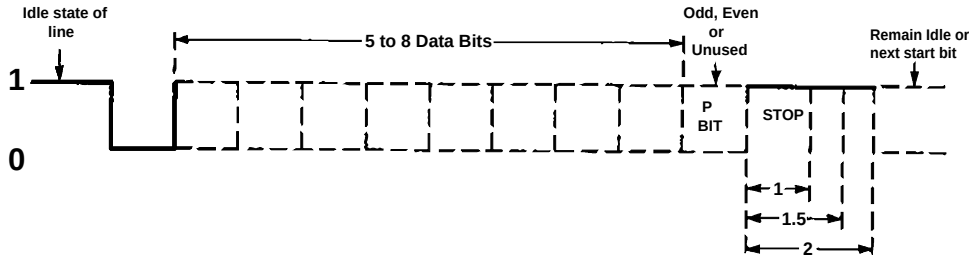
RS-485

RS-485 is backwardly compatible with RS-422; however, it is optimized for party line or multi-drop applications. The output of the RS-422/485 driver is capable of being Active (enabled) or Tri-State (disabled). This capability allows multiple ports to be connected in a multi-drop bus and selectively polled. RS-485 allows cable lengths up to 4000 feet and data rates up to 10 Megabits per second. The signal levels for RS-485 are the same as those defined by RS-422. RS-485 has electrical characteristics that allow for 32 drivers and 32 receivers to be connected to one line. This interface is ideal for multi-drop or network environments. RS-485 tri-state driver (not dual-state) will allow the electrical presence of the driver to be removed from the line. Only one driver may be active at a time and the other driver(s) must be tri-stated. RS-485 can be cabled in two ways, two-wire and four-wire mode. Two-wire mode does not allow for full duplex communication, and requires that data be transferred in only one direction at a time. For half-duplex operation, the two transmit pins should be connected to the two receive pins (Tx+ to Rx+ and Tx- to Rx-). Four-wire mode allows full duplex data transfers. RS-485 does not define a connector pinout or a set of modem control signals. RS-485 does not define a physical connector.

Appendix D – Asynchronous Communications

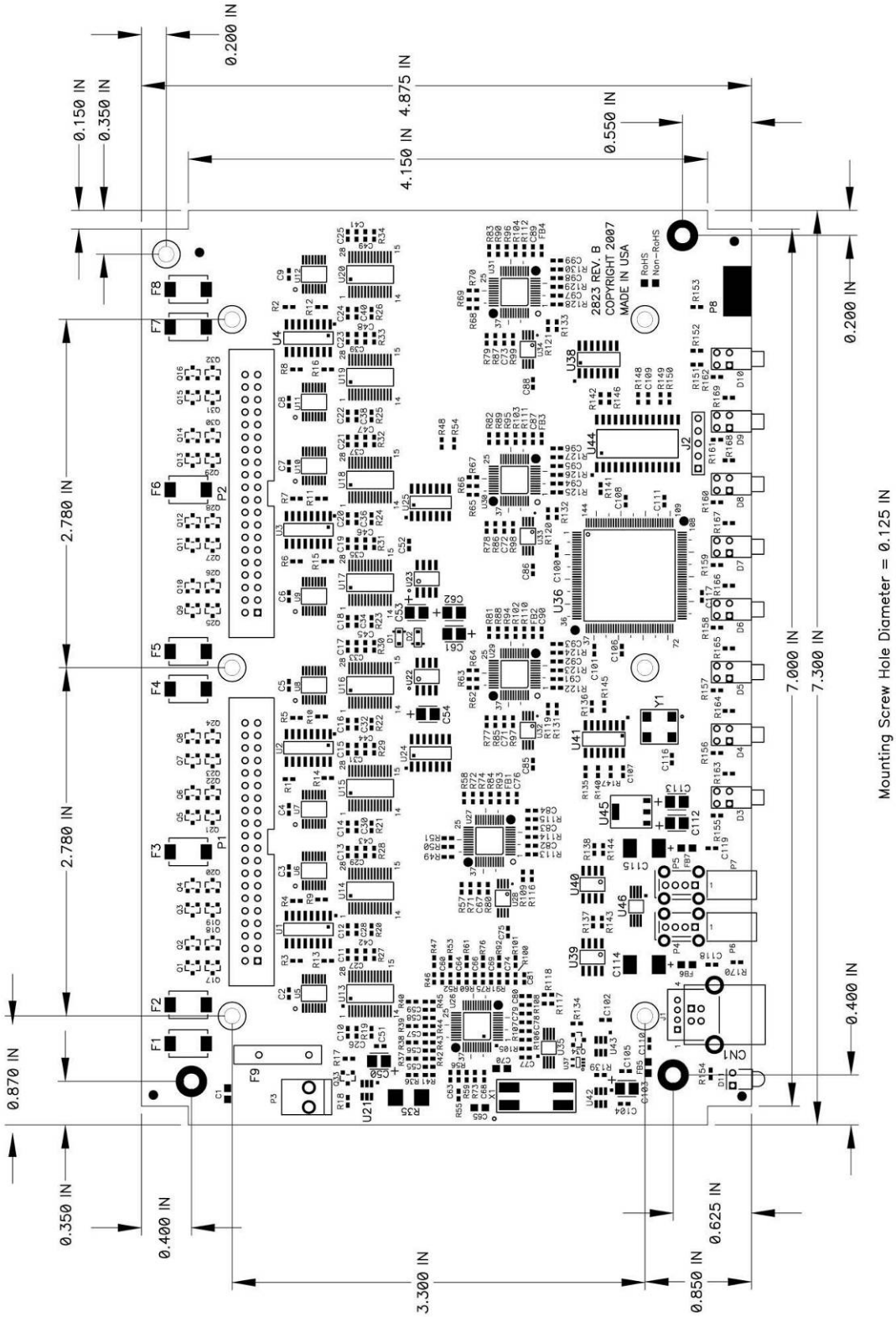
Serial data communications implies that individual bits of a character are transmitted consecutively to a receiver that assembles the bits back into a character. Data rate, error checking, handshaking, and character framing (start/stop bits) are pre-defined and must correspond at both the transmitting and receiving ends.

Asynchronous communications is the standard means of serial data communication for PC compatible and PS/2 computers. The original PC was equipped with a communication or COM: port that was designed around an 8250 Universal Asynchronous Receiver Transmitter (UART). This device allows asynchronous serial data to be transferred through a simple and straightforward programming interface. A starting bit followed by a pre-defined number of data bits (5, 6, 7, or 8) defines character boundaries for asynchronous communications. The end of the character is defined by the transmission of a pre-defined number of stop bits (usually 1, 1.5 or 2). An extra bit used for error detection is often appended before the stop bits. The diagram below demonstrates asynchronous communication bits.



This special bit is called the parity bit. Parity is a simple method of determining if a data bit has been lost or corrupted during transmission. There are several methods for implementing a parity check to guard against data corruption. Common methods are called (E)ven Parity or (O)dd Parity. Sometimes parity is not used to detect errors on the data stream. This is refereed to as (N)o parity. Because each bit in asynchronous communications is sent consecutively, it is easy to generalize asynchronous communications by stating that each character is wrapped (framed) by pre-defined bits to mark the beginning and end of the serial transmission of the character. The data rate and communication parameters for asynchronous communications have to be the same at both the transmitting and receiving ends. The communication parameters are baud rate, parity, number of data bits per character, and stop bits (i.e. 9600,N,8,1).

Appendix E – Silk Screen - 2423



Appendix F – Compliance Notices

Federal Communications Commission Statement

FCC - This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in such case the user will be required to correct the interference at the users expense.

EMC Directive Statement

Products bearing the CE Label fulfill the requirements of the EMC directive (89/336/EEC) and of the low-voltage directive (73/23/EEC) issued by the European Commission.

To obey these directives, the following European standards must be met:

EN55022 Class A - "Limits and methods of measurement of radio interference characteristics of information technology equipment"

EN55024 – "Information technology equipment Immunity characteristics Limits and methods of measurement".

EN60950 (IEC950) - "Safety of information technology equipment, including electrical business equipment"

Warning

This is a Class A Product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures to prevent or correct the interference.

Always use cabling provided with this product if possible. If no cable is provided or if an alternate cable is required, use high quality shielded cabling to maintain compliance with FCC/EMC directives.

Warranty

Sealevel's commitment to providing the best I/O solutions is reflected in the Lifetime Warranty that is standard on all Sealevel manufactured products. We are able to offer this warranty due to our control of manufacturing quality and the historically high reliability of our products in the field. Sealevel products are designed and manufactured at its Liberty, South Carolina facility, allowing direct control over product development, production, burn-in and testing.

Sealevel Systems, Inc. (hereafter "Sealevel") warrants that the Product shall conform to and perform in accordance with published technical specifications and shall be free of defects in materials and workmanship for life. In the event of failure, Sealevel will repair or replace the product at Sealevel's sole discretion. Failures resulting from misapplication or misuse of the Product, failure to adhere to any specifications or instructions, or failure resulting from neglect or abuse are not covered under this warranty.

Warranty service is obtained by delivering the Product to Sealevel and providing proof of purchase. **Return authorization must be obtained from Sealevel Systems before returned merchandise will be accepted. Authorization is obtained by calling Sealevel Systems and requesting a Return Merchandise Authorization (RMA) number.** The Customer agrees to insure the Product or assume the risk of loss or damage in transit, to prepay shipping charges to Sealevel, and to use the original shipping container or equivalent. Warranty is valid only for original purchaser and is not transferable.

Sealevel Systems assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Sealevel Systems will not be liable for any claim made by any other related party.

This warranty applies to Sealevel manufactured Product. Product purchased through Sealevel but manufactured by a third party will retain the original manufacturer's warranty.

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